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GEOGRAPHICAL RECORD.

AFRICA.

DR. UHLIG'S EXPLORATIONS AMONG HIGH AFRICAN MOUNTAINS.—The ascent of the Kibo summit of Mount Kilimanjaro in the summer of 1903 by three members of the East Africa expedition, led by Prof. Dr. C. Uhlig, was briefly described in the BULLETIN of 1904 (pp. 754–5). Dr. Uhlig has written for the *Zeitschrift* of the Berlin Geographical Society (Nos. 9 and 10, 1904) two articles entitled "Vom Kilimandscharo zum Meru," which form a preliminary account of the scientific work of this expedition. He reached a height of 19,500 feet on Kibo, the higher of the two summit peaks of Kilimanjaro, but the culminating point of Kibo, the top of Kaiser Wilhelm Peak, was still 200 feet above him. In addition to the facts mentioned in our earlier account of this ascent, Dr. Uhlig gives interesting details concerning the snow and glacier formations, illustrated by excellent photographs.

One feature is the occurrence on the surface of the slopes of long lines of strangely-shaped snow figures, several feet in height, considerably taller than those observed in the snow fields of the Andes, and which have been called "nieves penitentes," from the similarity they bear, when seen at a distance, to processions of white-robed penitents. The explorer says that those he saw on Kilimanjaro looked more like rabbits, dogs, and snow-men built by children than penitents. He attributes their formation to the ablation from insolation and the dryness of the air, though this does not explain "their regularity of arrangement, as they appear in two distinct lines, one up and down the slope and the other at right angles to the slope," or, in other words, along the contour lines. It is suggested (*Amer. Jour. of Sci.*, July, 1905) that this arrangement may be due to the cracking of the hardened snow in this regular manner, and that this, combined with the agencies he mentions, may explain the phenomenon.

On a second ascent of Kibo from the south, he discovered a new glacier, to which he gave the name of Richter Glacier.

The explorer then turned his attention to Meru, a great volcano to the west of Kilimanjaro, of which little has been known:

> Its height is about 15,200 feet. Uhlig's first ascent was made from upper Aruscha, on the south flank, at an elevation of about 4,500 feet. At 7,000 feet a girdle composed of dense masses of bamboos was met, which lasted to about 8,800 feet, and which required the greatest efforts to penetrate. It appears quite similar to the bamboo zone which Gregory encountered on Mt. Kenia, and which he found so difficult to surmount. Above this the mountain offered no special difficulties aside from the extraordinary steepness of its slopes. Towards its upper limit the flora assumes the distinctly alpine character noted on the other great volcanoes of equatorial Africa. Some forms of vegetation, grasses, compositæ, and *Arabis albida* persist even to the top.
>
> No snow was found on Meru, its summit falling over 2,000 feet short of the snow-line on the neighbouring Kilimandjaro. Nor were any marks of a former period of glaciation visible, although on Kilimandjaro, according to Meyer, the glaciation once extended some 3,000 feet lower than at present, and Gregory found evidences of much more extended glaciation on Kenia than it now shows. It is possible, however, that Meru may have had small hanging glaciers.

At the summit Uhlig found himself on the edge of a vast crater whose precipitous walls fell beneath him over 4,000 feet to the bottom. The highest point on the opposite wall he attempted in a second ascent from the northeast, but was unable to attain.

The mountain is a concentric crater, which shows several periods of volcanic activity. The completion of the Uganda Railroad and the continued, though slow, advance of the German railroad inland from Tanga, making wide areas easily accessible, are likely to stimulate detailed studies of other parts of eastern equatorial Africa, such as Uhlig has been making in the region of Kilimanjaro.

GEOGRAPHY AT THE BRITISH ASSOCIATION MEETING.—*Nature* (July 6) announced the completed arrangements for the South African meeting of the British Association. The number of members to attend the meeting was 385, of whom no less than 276 had announced their intention to visit the Victoria Falls after the ordinary work of the association. The lectures of a popular character to be delivered before citizens of the various towns where meetings were held included these geographical topics:

At Durban, "The Highest Himalaya," by Douglas W. Freshfield; at Bulawayo, "Zimbabwe," by Mr. Randall-MacIver.

The programme arranged for Section E (Geography) was as follows:

Cape Town.—President's address: "Afforestation of South Africa;" "The Ordnance Survey of the United Kingdom," by Col. Johnston; "The Unveiling of the Coasts of Africa" (lantern views of old maps), by H. Yule Oldham; "A Comparison of the Periodicity of the Meteorological Conditions of London and Cape Town," by Dr. H. R. Mill; "Gough Island," by Rudmose Brown; "Terrestrial Globes as a Necessary Adjunct to the Teaching of Geography," by Capt. Creak; "Excursions as a Means of Teaching Geography" (lantern), by J. Lomas.

Johannesburg.—"The Evolution of Africa," by Dr. J. Scott Keltie; "A New Rainfall Map of Africa," by A. J. Herbertson and P. C. Waite; "Boundaries and Areas in Africa," by J. Bolton; "The Physical Geography of the Transvaal," by Tudor Trevor; "Notes on the Geography of Africa South of the Limpopo," by F. S. Watermeyer; "The Game Preserves of the Transvaal," by Major Stevenson Hamilton; "The Sikkim Himalayas and Tibet," by Mr. Freshfield; an Asiatic subject by Prof. Cordier.

THE SUDAN ALMANAC FOR 1905.—This little annual, printed for residents in the Anglo-Egyptian Sudan, naturally contains much information not found in our own works of reference. The edition for 1905, for example, tells the people that they need not be afraid of desert water, even though it may be muddy, for all water of the desert is wholesome. If they find it brackish, however, they must not drink too much of it. If they meet water which tastes so badly that they cannot drink it, they may find some relief from thirst by immersing their arms in the water and keeping them there for some minutes. It is a good practice to sink in a muddy well a large tin or biscuit box perforated with small holes and covered on the outside with cotton cloth, the top of the box remaining above the surface of the water. The cloth will act as a strainer and the water in the box will be comparatively free from mud. Travellers carrying water with them are informed that a gallon of water weighs ten pounds, and a cubic foot of it sixty-two pounds. The minimum drinking water allowance for a man should be one and one-half gallons a day. A camel drinks from 12 to 18 gallons at a time, and should, if possible, be watered every other day. A horse drinks 6 gallons a day, one and one-half gallons at a time. For a long camel ride the waist and lower chest should be swathed fairly tight, with cloth bands to give support. To avert fever, mosquitoes should be avoided, and therefore camps should not be made near stagnant water.

AMERICA.

RETREAT OF THE ALASKAN GLACIERS.—Prof. George Davidson, who has carefully studied all the old charts and narratives relating to the glaciers along the coast of Alaska, has written a paper, "The Glaciers of Alaska that are Shown on Russian Charts or Mentioned in Older Narratives" (*Trans. and Proc. of the Geog. Soc. of* *the Pacific, Vol. 3, Series 2*). He presents, with the paper, copies of a number of the early charts, with the outlines of the latest maps, showing in this manner the changes that have occurred in the position of the ends of some of the glaciers. As nearly as he can determine there has been a general recession of the glaciers through the Aleutian Islands, the Peninsula of Alaska, and from Cook Inlet to Portland Channel, except where they come directly, or almost so, upon the broad ocean. The evidence of advance seems clear at Wimbleton or Taylor Bay, just inside Cape Spencer, at Icy Strait, since the survey of Whidbey; but the recent topographical survey by the U. S. Coast and Geodetic Survey shows a retreat behind the terminal moraine which it has left as a record.

The Malaspina Glacier has filled and obliterated the Icy Bay of Vancouver and Tebenkof. The recent Canadian Survey indicates that the glaciers of Lituya Bay have shortened the deep arms described by La Pérouse; and the La Pérouse Glacier, upon the ocean shore, shows positive signs of advance, according to the reports of the Harriman Expedition of 1899. In this region of advance, however, the immense ice blockade at the head of Yakutat Bay, so well depicted by Malaspina and confirmed by Tebenkof, has been carried away, and the Turner and Hubbard glaciers now discharge into the sharp bend of the fiord at the head of the bay. It is gratifying to note that wherever the recent surveyors have located a glacier front, they have given good bases for comparison with future surveys of similar character.

MARYLAND AND JOHNS HOPKINS UNIVERSITY.—The State of Maryland continues to illustrate the advantages of associating the scientific staff of a great university with the work of carrying out public utilities of a scientific character. Since their organization the Maryland Geological and Economic Survey and the Maryland State Weather Service have both been in charge of Prof. William Bullock Clark, who occupies the Chair of Geology in the University. The State annually appropriates the sum of $27,000 for the support of these two bureaux. An important number of Prof. Clark's assistants in these public services are members of the Faculty at Johns Hopkins. All the volumes of the "Maryland Geological Survey," from the first in 1897, together with the series of exhaustive reports on the resources of various counties, the volumes dealing with the systematic geology and paleontology of the State, and the various reports on the Physiography of Maryland and the State Weather Service, are permeated with the scientific spirit of the University staff, and to a considerable extent are the results of field work carried out by members of the Faculty. By a recent act of the Legislature the Geological Survey has also received control of the construction of the State highways, involving an annual expenditure of $400,000.

THE NORTHERN MAIDU.—These Indians of California, more commonly known as "Diggers," though that meaningless name is also applied to other Indians in that State, live in the northeastern portion, roughly speaking, between the Sacramento River and Nevada. Their language is distinct from that of other tribes, and they therefore constitute a stock by themselves, but they lack, like many other aborigines of the Pacific slope, any collective name as a group. Stephen Powers called them "Maidu," a word in their language meaning "Indian" or "Man." The study of these people was a part of the work of the Huntington Expedition in 1899, 1900, 1902, and 1903, and Mr. Roland B. Dixon has prepared a paper embodying the results of the investigation of the Northern Maidu, which appears in the *Bulletin* of the American Museum of Natural History (Vol. 17, Part 3, pp. 119–346), in which their history, material culture, social organization, customs, religion, etc., are described.

It is noteworthy that the Maidu, like most of the other stocks of California, have not been migratory on any large scale. It is in this respect that the Californian peoples differ greatly from the tribes and stocks of the eastern and central parts of the continent, which have been migratory on a large scale, and show over great areas a considerable uniformity of culture, while the California peoples show greater stability; and the culture of each tribe or stock being shaped in accordance with its own continuous environment, a greater variety of culture is apparent in California than in the East.

Many woodcuts illustrate the meagre arts of the Maidu, and a number of photographs show their huts, dance-houses, etc. No tribe can be wholly typical in a region of so much diversity as California, but Mr. Dixon says that in the simplicity of their culture, small development of the arts, dependence on roots, acorns, seeds, fruits, and game for food, rudimentary social organization and general character of their ceremonial life, the Maidu represent as well as any other stock the aboriginal culture of that part of the State.

PROPOSED EXPLORATION OF THE EAST COAST OF GREENLAND.—Since Peary rounded the most northern point of Greenland and mapped the north coast the only shore of the island that remains entirely unknown is the region between Cape Bismarck, in about 76° 40′ N. Lat., and Independence Bay, discovered by Peary. This unexplored stretch of the east coast extends for a distance of about 400 miles. Mr. L. Mylius Erichsen of Copenhagen, who was the leader of the so-called Danish Literary Expedition to Greenland which returned to Europe last year (BULLETIN, 1904, pp. 363–4), has declared his willingness to undertake the important task of exploring this part of the coast, and thus completing our knowledge of the periphery of the island. He is now endeavouring to raise funds for his expedition. Sir Clements R. Markham, in his address to the Royal Geographical Society in May (*Geog. Jour.*, July, 1905), emphasized the importance of making this exploration:

> It is, in some respects, a region of special interest. Here, if anywhere, a knowledge may be obtained of the very interesting migrations of Eskimo and large mammals from east to west. Clavering, in 1822, found 12 Eskimo on the coast between 74° and 75° N. But none has ever been seen since to the north of the settlement of Angmagsillek. Knowledge is also needed of the northern migrations of the musk-ox, reindeer, wolf, and fox. The numerous deep fiords should be explored, and the labours of the German expedition, of Nathorst, and of Amdrup require to be connected and completed.

Mr. Erichsen has already demonstrated his capacity, and the task he proposes would be in good hands under his leadership. He lived among the Smith Sound Eskimo for ten months, sledged across the island of Disco, visited the inland ice in two places, and knows most of the western coast of Greenland. His party sledged northward along the west coast from Jakobshavn in the south to Saunders Island in the north, and this was the first time that a sledge expedition skirted the entire coast of Melville Bay.

UNDERGROUND WATER RESOURCES OF THE GREAT PLAINS.—Mr. N. H. Darton, of the U. S. Geological Survey, has written a volume of 433 pp., entitled "Preliminary Report on the Geology and Underground Water Resources of the Central Great Plains" (U. S. Geol. Survey, Prof. Pap. 32). The geological features of the area discussed (most of South Dakota, Nebraska and Kansas, and westward to Central Wyoming and Colorado) are fully presented in the first half of the quarto; but the chief interest of the investigation lies in the question of water supply, which is very inadequate in a large part of this territory, and must be supplemented where possible by artesian wells, many of which have been sunk with excellent results.

It is believed that the rocks of Cambrian, Ordovician, Carboniferous, and Jurassic age underlie this entire area; but very few wells are found lower than the Cretaceous, and the water horizon of the Dakota sandstone is the most widely extended and most useful in the Great Plains. The sandstones outcrop extensively along the uplifts of the Black Hills, the Big Horn, and the Rocky Mountain front ranges, and in the Arkansas valley in Southern Colorado, where they receive large volumes of water, both from the rainfall and the sinking of water from streams.

The most important prospects of water from the Dakota sandstone, as yet undeveloped, are in the central and western parts of South Dakota, and in the region north of the Black Hills. In this formation, the author says, over 1,000 deep wells have been sunk east of the Missouri River, most of which are from 500 to 1,000 feet deep, and generally yield a large supply of flowing water, which is used for irrigation. The aggregate flow from these wells is about 7,000,000 gallons a day. There is as yet no valid evidence that the supply is diminishing, except in places where there are numerous wells. The supply from the Fox-Hills formation is much more limited. Useful wells are also developed in the Tertiary, particularly in the Denver basin. Large quantities of water from limited depths (5 to 50 feet) are also obtained from the alluvial deposits of the Quaternary, and the tubular wells in east South Dakota and east Nebraska yield the water of the glacial drift mainly at the base of the till.

The fact that the water is under great pressure shows that its altitude, where it originates, must be some thousands of feet above the point of delivery. Some wells in eastern South Dakota, for example, show surface pressures of over 175 pounds to the square inch, and two are over 200 pounds; in the latter case a pressure of 780 pounds at the bottom of the well is indicated. The volume gives full details concerning existing wells, and closes with a discussion of the economic geology of the region, such as the supplies of coal, petroleum, salt, gypsum, gas, etc. There are many fine views from photographs, and also geological maps and sections.

THE CONVENTIONS OF WEATHER BUREAU OFFICIALS.—In the mind of the general public the work of the Weather Bureau is usually associated only with the publication of daily weather maps and forecasts. There are, however, many activities in which the officials of the Bureau are engaged which are of a less public and consequently less well-known character, but which nevertheless deserve a wider recognition. Among these may be noted the several conventions of the officials of the Bureau. These gatherings are the means of bringing together, in a social way, many members of the Weather Service who would otherwise seldom or never meet, and thus of promoting an *esprit de corps* which tends to consolidate and to harmonize the various activities of the Bureau. But of more importance than the encouragement of the feeling of good fellowship and of co-operation is the opportunity for hearing and discussing papers on a very wide range of subjects of general interest in national weather service work. The papers which are presented at these conventions are, as a whole, marked by a direct, forceful, practical treatment of the matters which they deal; they furnish topics the discussion of which cannot fail to be of value to all those present, and in the printed reports of the proceedings of the conventions they are brought before the larger audience of the voluntary observers of the Bureau and of meteorologists in general the world over. The scope of these gatherings has gradually been enlarging since the first meeting was held in 1892, and their scientific value has steadily increased. In future years, as later meetings are held in different parts of the country, the good results which come from such conferences will be more generally appreciated and will attract more attention.

The first convention under the auspices of the National Weather Service was held at the Smithsonian Institution, in Washington, on February 24 and 25, 1886.

There were among the members of that convention the head of the Signal Service, Gen. W. B. Hazen; Messrs. Abbe, Ferrel, Mendenhall, Davis, Rotch, Upton, and representatives of State weather service organizations from Alabama, Indiana, Minnesota, New York, and Ohio. In 1892 there was organized the American Association of State Weather Services, which held its first meeting at Rochester, N. Y., August 15 and 16, 1892. The report of this meeting was published as Weather Bureau Bulletin No. 7, 1893. The second meeting was held in Chicago, August 21 to 25, 1893, in conjunction with the larger Congress under the auspices of the World's Fair, and the papers were published in Bulletin No. 11 of the Weather Bureau. The third meeting was at Brooklyn, N. Y., August 17, 1894, in conjunction with the American Association for the Advancement of Science. Bulletin No. 14 of the Weather Bureau contains a report of the proceedings. The fourth and last meeting of the American Association of State Weather Services was held at Indianapolis, Ind., October 16 and 17, 1895 (see Bulletin No. 18). This Association had from the start been nominally an affiliated society of the American Association for the Advancement of Science, but only two of the meetings of the former were in conjunction with those of the latter—viz., those at Rochester, in 1892, and at Brooklyn, in 1894. It was found that the meeting-places of the American Association for the Advancement of Science were often inconvenient for the Weather Bureau officials.

When Prof. Willis L. Moore became Chief of the Bureau the plan of these conventions was altered. It was decided that the membership should be composed of officials representing without restriction all lines of work conducted by the Weather Bureau, and that the conventions should be held once in three years instead of annually. The first convention of Weather Bureau Officials, under the new plan, was held in Omaha, Neb., October 13 and 14, 1898, the change in the membership of the gathering being evidenced by a change in the kind and number of the subjects discussed. In former years the discussions dealt with the climate and crop side of the Weather Bureau Work. The deliberations of the convention of 1898 covered practically the entire range of the Weather Bureau Work (Bulletin No. 24). In 1901 the Convention was held in Milwaukee, Wis., on August 27 to 29 (Bulletin No. 31), and in 1904 at Peoria, Il., on September 20 to 22. The Proceedings of the Third Convention of Weather Bureau Officials, recently published by the Weather Bureau, in an octavo report of 267 pages, show that a wide range of subjects, of great national interest and importance, was ably presented and discussed at this latest meeting. R. DEC. W.

THE VARIATION OF RAINFALL IN THE ARID REGION OF THE UNITED STATES.—More attention than ever before is being paid to questions of rainfall and of irrigation in the arid portions of the United States. The Weather Bureau, with its large collections of rainfall data, is constantly endeavouring to put before the public all the latest information which is available concerning the conditions of precipitation in those large sections of the country which are usually classed as arid. The latest publication in this connection is Bulletin *N*, entitled *Periodic Variation of Rainfall in the Arid Region*, by William B. Stockman, Chief of the Division of Meteorological Records of the Weather Bureau. This paper was read before the Twelfth National Irrigation Congress, which met at El Paso, Texas, November 16 to 18, 1904, and deals with rainfall at selected stations which lie between the 96th meridian and the central portions of Washington, Oregon, and California. Those stations were selected which show best the average conditions that have prevailed generally over the State or region in question, due consideration being given to the length and the continuity of the record and the altitude of the station. A large chart contains diagrams for eighty-four stations in the arid and sub-arid regions, showing graphically the average precipitation for each month. No isohyetal lines are drawn to show annual or monthly amounts of rainfall, but instead the data are given in tabular form. Table I shows the excess or deficiency of the annual average for the pentads (five years) as compared with the average annual precipitation for the entire period of observation. Table II shows the average monthly and annual precipitation at selected representative stations in the arid region. During the several pentads from 1869 to 1903, inclusive, the numbers of stations noted in the following table showed an excess or deficiency as compared with the entire period:

PENTAD.	STATIONS.	
	PLUS	MINUS
1869–1873	5	9
1874–1878	16	13
1879–1883	16	22
1884–1888	27	15
1889–1893	26	21
1894–1898	16	33
1899–1903	13	37
Total	119	150

It appears, therefore, that 119 stations showed an excess and 150 showed a deficiency. When the amounts of the excesses and deficiencies at the various stations are summarized a total deficiency of 26.02 inches is found for the whole period and the whole number of stations.

While this *Bulletin* cannot be considered very satisfactory, in view of the great differences in the length of the records and of the fact that they are not all reduced to the same period of time, it does present facts which are of interest to a large number of persons who have to do with our arid and sub-arid districts. R. DEC. W.

OPPORTUNITIES FOR INVESTIGATION IN THE OLYMPIC PENINSULA.—This peninsula occupies the extreme northwest corner of the United States, and, as all maps show, is almost cut off by water on every side. The irregular group of the Olympic Mountain ranges that radiate on all sides from Mount Olympus (8,150 feet) occupies most of the peninsula. The Olympic Forest Reserve, set apart in 1897, also includes most of the peninsula, which cannot now be said to be almost wholly unknown, as was the case ten years ago, for the Reserve has been traversed and studied, at least as far as its forest conditions are concerned, by the Geological Survey. The work of examination was carried on during the seasons of 1898, 1899, and 1900 by Messrs. Arthur Dodwell and Theodore F. Rixon, whose report was published in the 21st Annual Report of the U. S. Geol. Sur., Part V, and in 1902, somewhat expanded, as Professional Paper No. 7.

Numerous glaciers and snow fields were found in the central parts of the mountains and many rivers heading in the central mass and radiating outward in all directions.

This report does not deal, however, with the geology or some other important aspects of the peninsula. The following timely statements are condensed from an article by Mr. Henry S. Conard (*Science*, No. 532), who says that here is almost virgin soil for nearly all kinds of scientific investigation. He refers to the above-named paper, with its maps and illustrations, as the best account yet available concerning this region:

> . . . . The vegetation of the Olympic Peninsula is truly remarkable. Below 5,000 feet is the great northwestern forest, which must be seen to be appreciated. Douglas fir, tideland spruce and "red

cedar" (*Thuja plicata*) reach gigantic proportions. . . . What with fallen timber and undergrowth of ferns and shrubs the forest is a veritable jungle. By hard work one can travel a quarter of a mile an hour off the trails! . . . .

The matted tree tops admit only a gloomy light below, and the darkness is deepened by great blankets of *Selaginella* (*S. oregana*) and bearded lichen (*Usnea*) depending from the branches. A thick bed of moss covers all the ground and swathes the bases of the tree trunks. Above 2,000 feet, however, the forest is quite open, but travel is impeded much more seriously by the impassably sharp hogbacks and steep canyon walls. The mountains slope more gently southward than on other sides, and it is believed that Mt. Olympus could be reached from the valley of the Quiniault River. . . .

The fauna is equal to the flora in richness. Black bears, panthers, wild cats and wolves are numerous. A few squirrels and the mountain beaver are found. Deer and elk are plentiful. The garter snake is the only reptile. Wild duck and pheasants are occasional, and the familiar robin is seen about the houses. Salmon and trout of several kinds abound in all streams that are large enough. Quiniault salmon is said to be the finest on the coast. The report of the expedition from the Field Columbian Museum on the mammals of the Olympic Peninsula is the only record of its fauna.

In each river valley a distinct tribe of Indians originally made its home. The Makah at Cape Flattery were studied by Swan, and are an extremely interesting group. The Quillayutes and Quiniaults would equally repay an immediate investigation; but their old habits are rapidly vanishing before the Government schools. Whites began to settle the Quiniault Valley in 1892, but the movement is very slow on account of the difficulty of clearing land and of getting produce in and out. It is estimated to cost $200 an acre to remove the timber enough for farming operations.

Persons speak of the Olympics as volcanic, but we saw no sign of volcanism either in the rocks or in the pebbles of the Quiniault or Queets rivers. Along the coast a soft, green, marly, Cretaceous sandstone lies in gentle folds, each crest jutting out to sea as a steep headland 150 to 500 feet high. Rivers occupy the synclines. In the sandstone many fossils are found. Especially noticeable were stumps, logs and fragments of wood at different levels and in various stages of transition to lignite. Capping this stratum is a layer of recent yellow gravel, varying from ten to forty feet in thickness, and also enclosing logs and stumps. . . .

METEOROLOGICAL INSTRUCTION IN THE UNITED STATES.—Within the last few years several efforts have been made to obtain accurate information regarding the exact conditions of meteorological instruction in the schools and colleges of the United States. The investigation is one well worth undertaking, because the subject of meteorology is one of great and growing importance, and because the status of meteorological instruction is uncertain and, on the whole, discouraging. The unsatisfactory conditions may be explained in various ways: the feeling that meteorology is not worthy of a recognized place in school or university curriculum; the lack of capable teachers; the failure of school authorities to allot the necessary time for the work; the fact that there is no career open to any considerable number of trained meteorologists, and so on. Doubtless these, and many other reasons, have operated to keep meteorology out of the place which it is slowly winning for itself; for that it is gaining ground year by year is clear to any one who looks over the field of common-school and of college education year after year. There is no question that students of geology, botany, zoology, medicine, and engineering, to mention no other subjects, would all be much helped by a fairly systematic training in the elements of meteorology, and, were such instruction required of them, the teaching of meteorology would at once be extended and improved throughout the country, both in schools and in colleges. This would mean a greater demand for teachers of meteorology. That there is opportunity for persons skilled in meteorology and climatology to make themselves useful and valuable in many different lines of business activity there is no question. But more and more emphasis should be laid on the practical application of the facts which the students acquire, in climatology especially, where the importance of the climatic control over the occupations and activities, as well as over the health of man, has received far too little emphasis.

About a year ago, by direction of the Secretary of Agriculture, a circular letter was sent to all persons who were believed to be engaged, or interested, in the teaching of meteorology in schools and colleges in the United States. The object of the inquiry was to obtain information regarding the number and character of the courses of instruction that are now being given; the demand for such courses; the didactic value of meteorology as a course of mental training, and the commercial or pecuniary value of meteorology as a professional career. The replies to this circular, which have been printed by the Weather Bureau, may be briefly summarized as follows: At several of the universities and colleges courses in elementary meteorology are given, usually by instructors whose main business is along other lines of work. In some cases such courses have been given and then discontinued. Weather Bureau officials in many places are doing their best, in a most praiseworthy manner, to stimulate interest in the study. Scattering schools, here and there, where the teachers of physiography or of some other branch of science have a special interest in meteorology, pay some attention to systematic work in the subject. But there is a very evident lack of proper, systematic, thorough, well-co-ordinated instruction in meteorology in the country as a whole, from schools to universities. There is but one university where meteorology may be taken as a subject for admission, and that same university is the only one in the country which deems meteorology and climatology of sufficient importance for one professor to give his whole time to teaching the subjects.

R. DEC. W.

REPORT OF THE SUPERINTENDENT OF THE COAST AND GEODETIC SURVEY, 1904. —This report gives the progress of work from July 1, 1903, to June 30, 1904.

Mr. O. H. Tittmann, Superintendent, reports the completion of determination of difference of longitude between San Francisco and Manila. This work also determined the longitude of Honolulu and Guam. The new Alaskan boundary was taken up subsequent to the decisions of the Boundary Tribunal, and magnetic determinations have been made at 367 stations.

Field work was accomplished for revision of two volumes of the Coast Pilot, covering the coast from Point Judith, R. I., to the entrance of the Chesapeake Bay. The charting of the imperfectly-known waters of the Philippine Archipelago was carried on during the year.

The comprehensiveness of the Survey's work appears in the fact that one member served on the Mississippi River Commission; work was completed on Mason and Dixon's Line between Maryland and Pennsylvania; work was done on the oyster beds of Louisiana; the Superintendent aided in presenting the American Case to the Alaskan Tribunal; and the vessels of the Survey several times responded to calls to patrol racing regattas. The total appropriation for the year was nearly one million dollars. In the necrology for the year is found the name of a well-known member of the force—Mr. Adolph Lindenkohl. The record of field operations in detail fills most of the volume.

A. P. B.

FIELD OPERATIONS OF THE BUREAU OF SOILS, 1903, BY MILTON WHITNEY, CHIEF.—With many accompanying papers, and an extended series of maps in case. This large volume of over 1,300 pages, with the maps, constitutes the fifth report of this Bureau. The following facts are taken from Mr. Whitney's brief preliminary report. Representatives of the Bureau have organized soil-survey work in the Philippine Islands. Forty-five men are in the actual work of soil-survey, nearly all of such experience as to be in charge of parties. Work has been carried on for the whole year by assignment to southern areas during the winter. Nearly thirty-five thousand square miles had been surveyed before 1903, and more than twenty-six thousand miles were added during that year. Work was done in nearly forty States and Territories, and the average cost was $2.22 per square mile. In a number of cases the work has been done in co-operation with State or local organizations, including experiment stations in Illinois, Louisiana, and South Dakota, the geological survey of Maryland, and Cornell University. By a new plan of publication advance sheets of separate papers are made locally available in large numbers, saving the waste of distributing widely so bulky a report. Prospective settlers, land and loan institutions, insurance companies, and schools are making increasing use of these reports. The papers included are interesting studies of particular localities, and, in addition to a description of the soils, give much information as to the agriculture, physiography, climate, history, and economic conditions of the several areas. A. P. B.

ASIA.

RAILROAD PROBLEMS IN CENTRAL CHINA.—Lieut. Col. C. C. Manifold, of the British army, shows in the *Geographical Journal* for June some important phases of the railroad projects in central China. The paper describes his journey in 1904, when he examined parts of the lower Yangtze provinces east of Sechwan, the largest and wealthiest of the provinces of China, together with a large part of the Han River valley and the region between it and eastern Sechwan, which has hitherto been little known. This investigation was carried out to ascertain whether this region might afford a route by which adequate communications could be opened between the outer world and Sechwan, with its population of about 50,000,000.

He found that the railroad from Peking to Hankow on the Yangtze River is now completed, except for the interruption at the Yellow River, which is still unbridged, and is likely to be so for some years, as the work will be a large undertaking. Passengers are now booked through on this route from Peking to the Yangtze, the Chinese are taking readily to the road as a means of freightage, and it has already begun to pay a profit. He says the Chinese are beginning to welcome the idea of railroads. Between this road and the navigable eastern tributaries of the Han the only means of transport now used is the wheelbarrow, which is by no means to be despised. One man carries in his barrow as much as 350 pounds, or double the weight that the Government pack mule is allowed to carry in India; and he transports this weight from 12 to 20 miles a day.

Lao-ho-ku is the most important trading centre on the Han above Hankow, for it is the head of navigation for large junks. Goods are from 14 to 28 days making this journey of 300 miles from Hankow. The average depth of water is about 3⅓ feet, and steam navigation on the Han is not likely to be successful for more than 100 miles, except in the most favourable stages of water. Wholesale dealers in foreign cottons at Lao-ho-ku are said to do a business of 10,000,000 taels a year, and there is also a large trade in varnish oil sent to Japan, and in general goods. This important town was not generally marked, even on the best atlas sheets, previous to 1901.

Most of the country between the Han and the Yangtze Rivers has been found to be filled with mountain ranges, barren and sterile, but with very large populations in the narrow valleys, where the soil is cultivated with extreme care. Much grain is imported in exchange for paper, which is a large manufacture. The rivers are of little commercial value, but there is much coal in the valleys, and American, Belgian, and French engineers have visited these districts to study the prospects. Col. Manifold says that the country from Lao-ho-ku west to Chu-shan in this region will afford a practical alignment for a railroad into the heart of this coal region. The railroad will probably be built if the prospects warrant it.

The expedition travelled over 300 miles through this very mountainous country, and at present the prospects are very poor that a practicable railroad route will be found through these mountains to eastern Sechwan. Col. Manifold does not name the route which he recommends as most feasible for a railroad from eastern China into Sechwan, but he speaks of the road as destined to enter that province from the lower Yangtze, and says that Chungking, the commercial metropolis of Sechwan, must be the first objective of the road.

The Chinese provincial authorities told him they wished to undertake all future railroad construction themselves, with wholly Chinese capital and management—an ambition which Col. Manifold thought could not be fulfilled. The parties which Col. Manifold has led in the past four years have surveyed 8,000 miles of routes, and mapped them on a scale of 2 miles to an inch. When it is deemed expedient to publish the information this map contains it will be printed on a reduced scale.

STOCK-RAISING IN CHINA.—The industry of stock-raising for food purposes is almost unknown in China. Flesh is rarely eaten. Fish on the coast and along the rivers is extensively used. Pork, and locally poultry, are the chief meats eaten in the interior.

In the province of Chehkiang pork retails at 9 cents (gold), mutton at 6½ cents, and beef at 5 cents per pound. While this is cheaper than with us, it must be borne in mind that 10–12 cents (gold) per day is a very good wage in China.

The consumption of beef and mutton is increasing, however, and the supply is decreasing, with a corresponding rise in prices. Vice-Consul F. D. Cloud of Hangchau is authority for the statement that the scarcity of stock is only due to a failure on the part of the people to appropriate the hill grasses, He says there are "thousands of acres of hill land in Chehkiang alone covered all the year with luxuriant grass," that this nutritious food is "in a mild, favorable climate and easily accessible," but it goes to waste. There is here an industry to be developed.—(*Monthly Consular Report, May, 1905.*) G. D. H.

THREE SWISS INDUSTRIES.—Switzerland is a country well enough watered to be clothed with rich grass; hence grazing, and especially stock-raising for dairy products, has grown to be a great industry. 740,000 cows, yielding a milk product of $44,000,000, feed on the mountain slopes, and 56 per cent. of this milk is converted into condensed milk, cheese, and butter. The cheese is made in about 2,000 small factories scattered all through the mountain valleys. Its export in 1903 was valued at $8,000,000. This does not include the considerable amount of cheese made from goats' and sheep's milk.

Another industry established, in part, upon grazing, is that of chocolate and milk chocolate making. In 1903 over $2,000,000 worth of chocolate and shells imported from Colombia, Brazil, and Central America was manufactured into these sweets, and over 4½ million dollars' worth of the product was exported.

The third characteristic industry is that of watchmaking. About 25,000 persons are employed in the Swiss watch factories, and several more thousand make watches in their own homes. The centre of this industry is now in the Berne district, which contains two-thirds of the factory hands and three-fourths of the factories. The export of the product—watches and watch parts—amounted, in 1902 and in 1903, to about $23,000,000 each year.—(*Consular Report, May, '05.*) G. D. H.

POLAR.

AMUNDSEN'S EXPEDITION.—The recent report that Amundsen was expected soon to reach San Francisco through Bering Strait had no other foundation than the fact that the whaling fleet had been requested to carry some supplies to the Arctic coast of Alaska and to the Mackenzie delta for his use, in case he should succeed in making the northwest passage. It was well known before he left Europe for the region of the Magnetic North Pole that he desired, after relocating the Pole and completing his studies of terrestrial magnetism in that region, to make the northwest passage in his small vessel, the *Gjöa*, if possible, coming out at Bering Strait. It has been thought that this may possibly be done, in favourable seasons, by hugging the coast of the mainland rather closely, and thus avoiding the heavy ice north of the islands along the shore. Nansen expresses the belief that it may be possible for Amundsen to make this journey; and Sir Clements R. Markham said, in his last annual address before the Royal Geographical Society:

> It is not impossible that he may make the northwest passage. Such a gallant attempt deserves success, and I hope my friend Amundsen may attain his heart's desire.

GENERAL.

Eclipse of the Sun Expedition.—The expeditions sent out by the United States Government to observe the eclipse of the sun at Bona, Algeria, and Valencia, Spain, on Aug. 29, were carried to Spain on the U. S. cruiser *Minneapolis*. The instruments and materials for the observ ation stations were transported by the auxiliary cruiser *Dixie* and the collier *Cæsar*. The expedition was in charge of Rear-Admiral Colby M. Chester, Superintendent of the U. S. Naval Observatory.

The Newark (Triassic) Traps.—During the past summer Prof. J. Volney Lewis, of Rutgers College, has made for the State Geological Survey a special investigation of the petrography of the Newark (Triassic) traps of New Jersey.

Dr. G. D. Hubbard goes to the Ohio State University.—G. D. Hubbard, Ph.D., who has been instructor at Cornell University in Physical Geography and Geology, has been appointed Assistant Professor of Geology at the Ohio State University, Columbus. He will also take charge of the geography work, and it is hoped that a group of courses in that study will be built up in the University.

Explorations of the Atmosphere.—The Blue Hill Observatory continued its studies of the upper air by means of balloons, at St. Louis, during the first three months of this year. The experiments were conducted by Mr. Clayton under the direction of Mr. Rotch. Nine more ascents were made and every balloon but one was found, and, with the attached instruments, returned to Blue Hill. The German expanding balloons, with French self-recording instruments, were used. All the balloons fell within the eastern half of a circle having its centre at St. Louis and a radius of 285 miles. On January 25, with a high barometric pressure at the ground, a temperature of −111° F. was recorded at a height of 48,700 feet, this being one of the lowest natural temperatures ever observed. The experiments were so successful that Prof. Langley, Secretary of the Smithsonian Institution, granted Mr. Rotch $1,000 from the Hodgkins Fund to continue them this summer at St. Louis, in charge of Mr. Fergusson of the Blue Hill Observatory.

Soundings of the atmosphere, made at different seasons, should reveal the annual variation of temperature at great heights above the American continent, which is at present unknown.

Kites are regularly sent up at Blue Hill on the days fixed by the International Committee, and they are also being employed to ascertain the conditions above the Atlantic Ocean in the trade-wind region. Mr. L. Teisserenc de Bort, the well-known French meteorologist, placed his steam yacht at the service of Mr. Rotch, the latter sharing the expense of the cruise. Mr. Clayton, accordingly, left this country on

June 3 to meet the yacht *Otaria*, of 350 tons, at Gibraltar, and then go south, touching at Madeira and the Canary and Cape Verde Islands, and, perhaps, on to St. Paul, near the Equator, returning by a more westerly course to the Azores, the voyage occupying six weeks. The northeast trade-winds and doldrums will be traversed and the southeast trades entered. It is hoped that all the strata up to a height of 15,000 feet or more will be penetrated, so that their condition as regards temperature, moisture, and wind may be investigated.

The depth of the northeast trade-wind will be investigated and the supposed southwest or return trade, which has been observed only on the Peak of Teneriffe, will be sought and its height above the ocean, in different latitudes, measured. In case the kites do not reach a sufficient altitude, small balloons will be liberated from Madeira and their change of direction will be observed as they rise.—(Condensed from *Science*, No. 550.)

TRANSPLANTING AQUATIC FOOD ANIMALS.—A very important line of work which our Fish Commission is carrying on is the transplanting of aquatic food animals into waters to which they are not indigenous. The *Report* of the Commission for 1903 mentions two very successful instances of the acclimatization of native fishes. About 30 years ago the shad and the striped bass of the Atlantic coast were introduced on the Pacific coast; the slender colonies became established, flourished, extended themselves widely, and multiplied to such an extent that these two species now rank among the leading food fishes of the Pacific States, and in some places exist, perhaps, in greater abundance than in any waters on the Atlantic coast. The total cost of planting these fish on the Pacific coast was less than $5,000. The aggregate catch to the end of 1902 was 18,900,000 pounds, worth $670,000. The marine establishments of the Commission have for years been hatching cod in large numbers on the north Atlantic coast, with the result that since 1889 a very lucrative shore cod fishery has been kept up on grounds that were entirely depleted, or had contained only few cod. The Commission is thus proving that the effects of human improvidence may be counteracted by man's ingenuity and ability to aid nature.

PERSONAL.

Dr. Franz Boas has resigned the curatorship of the Anthropological Department of the American Museum of Natural History. He is still connected with the Museum, however, and will conduct the researches and publications of the Jesup North Pacific Expedition and of the East Asiatic Committee.

Mr. Jacob Schiff, of New York, has presented $50,000 to Harvard University, to be devoted to exploration in Palestine.

At the annual meeting of the Royal Geographical Society, in May, Sir George D. T. Goldie was chosen to succeed Sir Clements Markham as President of the Society. The new president has travelled extensively in Africa, especially in the Niger regions, is regarded as an expert on Niger questions, and was the founder of the British Protectorate of Nigeria. The annual dinner of the Society was really a complimentary banquet to the retiring president, who devoted himself with the greatest energy to the interests of geography and the affairs of the Society during his long administration. Messages of regret upon the retirement of Sir Clements Markham were read from the King and the Prince of Wales.